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synchronous signaling rates for data transmission

X3.1-1976

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This standard has been adopted for Federal Government use.

Details concerning the use of this standard within the Federal Government are contained in FIPS PUB 22-1, SYNCHRONOUS SIGNALING RATES BETWEEN DATA TERMINAL AND DATA COMMUNICATION EQUIPMENT. For a complete list of the publications available in the FEDERAL INFORMATION PROCESSING STANDARDS Series, write to the Office of Technical Information and Publications, National Bureau of Standards, Washington, D.C. 20234.

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X3.1-1976
Revision of
X3.1-1969

American National Standard Synchronous Signaling Rates for Data Transmission

Secretariat

Computer and Business Equipment Manufacturers Association

Approved August 14, 1976
American National Standards Institute, Inc

American National Standard

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Foreword

(This Foreword is not a part of American National Standard Synchronous Signaling Rates for Data Transmission, X3.1-1976.)

This standard provides information on the transfer of data between data processing equipment and data communication equipment that transmits data over media commonly referred to as voice band. Signaling rates for use at greater than voice bandwidth are prescribed by American National Standard Synchronous High-Speed Data Signaling Rates between Data Terminal Equipment and Data Communication Equipment, X3.36-1976.

This standard is a revision of X3.1-1969, to which two changes have been made: Recognition of the interim standard serial signaling rate of 2000 bits per second has been withdrawn, and preferred standard parallel signaling rates are specified. X3.1-1969 was a consolidation and revision of still earlier American National Standards: X3.1-1962, Signaling Speeds for Data Transmission, and X3.13-1966, Parallel Signaling Speeds for Data Transmission. Other issued and future standards define and will define additional electrical parameters vital to the connection of and transfer of data between data terminal equipment and data communication equipment.

This standard was developed by Subcommittee X3S3 in coordination with Electronic Industries Association (EIA) Engineering Committee TR-30 and is technically identical to EIA RS-269-B, January 1976, Synchronous Signaling Rates for Data Transmission. The following considerations were taken into account: existing standards – even those partially covering the field, present state-of-the-art and design trends for future data transmission equipment, and the possible future work of the subcommittee in the areas of speeds and other parameters pertinent to the performance of data transmission systems.

Suggestions for improvement of this standard will be welcome. They should be sent to the American National Standards Institute, 1430 Broadway, New York, N.Y. 10018.

This standard was processed and approved for submittal to ANSI by American National Standards Committee on Computers and Information Processing, X3. Committee approval of the standard does not necessarily imply that all committee members voted for its approval. At the time it approved this standard, the X3 Committee had the following members:

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Task Group X3S36 on Digital Data Signaling Rates, which had technical reponsibility for the development of this standard, had the following members:

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S. Schreiner

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American National Standard Synchronous Signaling Rates for Data Transmission

1. Scope and Purpose

1.1 Scope. This standard provides a group of specific signaling rates for synchronous serial or parallel binary data transmission. These rates exist on the received data and transmitted data circuits of the interface between data terminal equipment and data communication equipment that operate over nominal 4-kHz voice bandwidth channels.

1.2 Purpose. This standard results from indications by data equipment manufacturers and suppliers of data communication channels that the establishment of specific signaling rates is important to ensure compatibility between communication channels and data terminal equipment of data communication systems.

2. Standard Signaling Rates

2.1 The standard serial signaling rates shall be 600 × N bits per second, where N may be any positive integer from 1 through 16.

2.1.1 The preferred standard signaling rates shall be 600, 1200, 2400, 4800, 7200, and 9600 bits per second.

2.1.2 For those applications requiring synchronous operation below 600 bits per second, the standard signaling rates shall be 75, 150, and 300 bits per second.

2.2 The standard parallel signaling rates for equipment designed to operate with up to 8 parallel data bits per character shall be 75 × N characters per second, where N may be any positive integer from 1 through 16.

2.2.1 The preferred standard parallel signaling rates shall be 75, 150, 300, 600, 900, and 1200 characters per second.

3. Rate Tolerances

The serial signaling rates defined herein shall conform to the tolerance defined in American National Standard Signal Quality at Interface between Data Processing Terminal Equipment and Synchronous Data Communication Equipment for Serial Data Transmission, X3.24-1968 (EIA RS-334-1967).

The tolerance on parallel signaling rates is not defined at this time.

4. Unit Element Duration

A synchronous signal train at the interface between the data communication equipment and the data terminal equipment after synchronization is established shall consist of a sequence of marking and spacing signals whose durations are all nominally integral multiples of the unit interval. The unit interval duration in seconds is the reciprocal of the modulation rate in bauds.

Appendix

(This Appendix is not a part of American National Standard Synchronous Signaling Rates for Data Transmission, X3.1-1976, but is included for information purposes only.)

Application

A1. Error Control Devices

Where error control or similar devices that change the signaling rates by a fixed ratio are inserted between the data terminal source/sink equipment and the data communication channel equipment, the 600 × *N* standard signaling rates apply at the interface between the data terminal equipment and the data communication equipment, as shown in Fig. A1.

A2. Data Rate Converters

When data rate converters that result in a nonstandard signaling rate at the data processing equipment junction with the rate converter are used, the converter should furnish the clocking for the data processing equipment.

A3. Parallel Data Transfer

For parallel data transfer at the interface, the standard rates for up to 8 bits per character are as specified in 2.2. If eight channels are supplied, but fewer than eight used for data, the excess bit channels should be run in an idling condition or by using no-data bits.

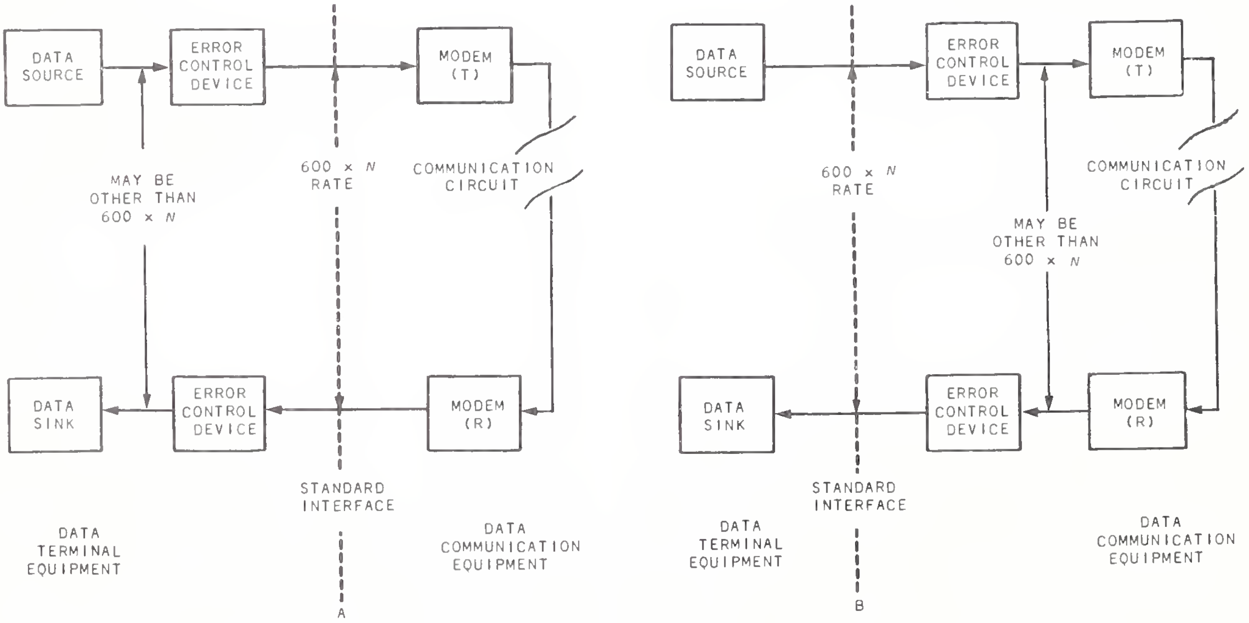

Fig. A1
Interface between Data Terminal Equipment and Data Communication Equipment

American National Standards on Computers and Information Processing

X3.1-1976 Synchronous Signaling Rates for Data Transmission

X3.2-1970 (R1976) Print Specifications for Magnetic Ink Character Recognition

X3.3-1970 (R1976) Bank Check Specifications for Magnetic Ink Character Recognition

X3.4-1968 Code for Information Interchange

X3.5-1970 Flowchart Symbols and Their Usage in Information Processing

X3.6-1965 (R1973) Perforated Tape Code for Information Interchange

X3.9-1966 FORTRAN

X3.10-1966 Basic FORTRAN

X3.11-1969 Specification for General Purpose Paper Cards for Information Processing

X3.12-1970 Vocabulary for Information Processing

X3.14-1973 Recorded Magnetic Tape for Information Interchange (200 CPI, NRZI)

X3.15-1976 Bit Sequencing of the American National Standard Code for Information Interchange in Serial-by-Bit Data Transmission

X3.16-1976 Character Structure and Character Parity Sense for Serial-by-Bit Data Communication in the American National Standard Code for Information Interchange

X3.17-1974 Character Set and Print Quality for Optical Character Recognition (OCR-A)

X3.18-1974 One-Inch Perforated Paper Tape for Information Interchange

X3.19-1974 Eleven-Sixteenths-Inch Perforated Paper Tape for Information Interchange

X3.20-1967 (R1974) Take-Up Reels for One-Inch Perforated Tape for Information Interchange

X3.21-1967 Rectangular Holes in Twelve-Row Punched Cards

X3.22-1973 Recorded Magnetic Tape for Information Interchange (800 CPI, NRZI)

X3.23-1974 Programming Language COBOL

X3.24-1968 Signal Quality at Interface between Data Processing Terminal Equipment and Synchronous Data Communication Equipment for Serial Data Transmission

X3.25-1976 Character Structure and Character Parity Sense for Parallel-by-Bit Communication in the American National Standard Code for Information Interchange

X3.26-1970 Hollerith Punched Card Code

X3.27-1969 Magnetic Tape Labels for Information Interchange

X3.28-1976 Procedures for the Use of the Communication Control Characters of American National Standard Code for Information Interchange in Specified Data Communication Links

X3.29-1971 Specifications for Properties of Unpunched Oiled Paper Perforator Tape

X3.30-1971 Representation for Calendar Date and Ordinal Date for Information Interchange

X3.31-1973 Structure for the Identification of the Counties of the United States for Information Interchange

X3.32-1973 Graphic Representation of the Control Characters of American National Standard Code for Information Interchange

X3.34-1972 Interchange Rolls of Perforated Tape for Information Interchange

X3.36-1975 Synchronous High-Speed Data Signaling Rates between Data Terminal Equipment and Data Communication Equipment

X3.37-1974 Programming Language APT

X3.38-1972 Identification of States of the United States (Including the District of Columbia) for Information Interchange

X3.39-1973 Recorded Magnetic Tape for Information Interchange (1600 CPI, PE)

X3.40-1976 Unrecorded Magnetic Tape for Information Interchange (9-Track 200 and 800 CPI, NRZI, and 1600 CPI, PE)

X3.41-1974 Code Extension Techniques for Use with the 7-Bit Coded Character Set of American National Standard Code for Information Interchange

X3.42-1975 Representation of Numeric Values in Character Strings for Information Interchange

X3.44-1974 Determination of the Performance of Data Communication Systems

X3.45-1974 Character Set for Handprinting

X3.46-1974 Unrecorded Magnetic Six-Disk Pack (General, Physical, and Magnetic Characteristics)

X3.49-1975 Character Set for Optical Character Recognition (OCR-B)

X3.50-1976 Representations for U.S. Customary, SI, and Other Units to Be Used in Systems with Limited Character Sets

X3.51-1975 Representations of Universal Time, Local Time Differentials, and United States Time Zone References for Information Interchange

X3.52-1976 Unrecorded Single-Disk Cartridge (Front Loading, 2200 BPI), General, Physical, and Magnetic Requirements

X3.53-1976 Programming Language PL/I

X3.54-1976 Recorded Magnetic Tape for Information Interchange (6250 CPI, Group Coded Recording)

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